CLAIMS

1. A method for improving the uniformity of a tire comprising the steps of:

(a) Determining a set of vector coefficients corresponding to the after cure radial force variation of a tire, comprising the sub-steps of:

(i) Recording a loading angle of a tire carcass on a measurement fixture

(ii) Measuring the before cure radial runout of a plurality of finished tires,

(iii) Recording a loading angle of said finished tires in a curing mold and curing said tires,

(iv) Measuring the after cure radial force variation for each of said tires,

(v) Extracting at least one harmonic of the radial runout and of the radial force variation of said tires,

(vi) Determining a set of vector coefficients relating the before cure radial runout to the after cure radial force variation of said tires cured in said mold,

(vii) Storing said vector coefficients,

(b) Estimating the after cure uniformity of an individual tire comprising the sub-steps of:

(i) Recording a loading angle of a carcass of said individual tire on said measurement fixture

(ii) Measuring the before cure radial runout of said individual tire,

(iii) Choosing a harmonic of radial force variation to be optimized,

(iv) Extracting a harmonic of radial runout of said individual tire,

(v) Estimating a tire room effect vector of the radial force variation corresponding to said harmonic,

(vi) Estimating a curing room effect vector of the radial force variation corresponding to said harmonic,

(c) Optimizing the after cure uniformity of an individual tire comprising the sub-steps of:

(i) Determining an azimuth of said tire room effect vector and of said curing room effect vector,

(ii) Aligning the angular position of said individual tire such that said azimuth of said tire room effect vector opposes said curing room effect vector, and

(iii) Placing said individual tire so aligned in said curing mold and curing said tire.

2. The method for improving the uniformity of a tire according to Claim 1, wherein said measurement fixture is a tire building drum.

3. The method for improving the uniformity of a tire according to Claim 1, wherein said measurement fixture comprises a tangential imaging means.

4. The method for improving the uniformity of a tire according to Claim 1 wherein a pair of said vector coefficients corresponds to a building drum vector.

5. The method for improving the uniformity of a tire according to Claim 1, wherein a pair of said vector coefficients corresponds to a tire gain vector.

6. The method for improving the uniformity of a tire according to Claim 1 wherein a pair of said vector coefficients corresponds to an intercept vector.

7. The method for improving the uniformity of a tire according to Claim 1 wherein a pair of said vector coefficients corresponds to said curing room effect vector.

8. The method for improving the uniformity of a tire according to Claim 1 wherein said tire room effect vector comprises the vector sum of a before cure tire effect vector, a building drum vector, and an intercept vector.

9. The method for improving the uniformity of a tire according to Claim 1 wherein a before cure tire effect vector comprises a vector product of a tire gain vector and a green tire radial runout vector of said harmonic.

10. The method for improving the uniformity of a tire according to Claim 1, wherein the sub-steps of determining said vector coefficients are performed in a simultaneous step.

11. The method for improving the uniformity of a tire according to Claim 10, wherein said simultaneous step comprises a multivariate least–squares regression.

12. The method for improving the uniformity of a tire according to Claim 1, further comprising the steps of recording an identifier for a specific building drum and for a specific curing cavity

13. The method for improving the uniformity of a tire according to Claim 12, wherein each of said steps of determining a set of vector coefficients, estimating the after cure uniformity, and optimizing the after cure uniformity comprises a multivariate least–squares regression of a set of matrix equations corresponding to multiple building drums and multiple curing cavities

14. The method for improving the uniformity of a tire according to Claim 1, wherein the step of determining a set of vector coefficients further comprises the sub-step of recording a loading angle of a cured tire on a uniformity measurement machine.

15. The method for improving the uniformity of a tire according to Claim 1, wherein a pair of said vector coefficients corresponds to a uniformity machine vector

16. The method for improving the uniformity of a tire according to Claim 1, wherein the step of determining a set of vector coefficients is repeatedly updated using data from said individual tire.

17. The method for improving the uniformity of a tire according to Claim 1, wherein said step of determining a set of vector coefficients and said step of optimizing the after cure uniformity are carried out using the first through fifth harmonics.